Outdoor and Nature Experiences in Forests for Forest Education: Contents of Activities and Forest Place in Hachioji, Tokyo, Japan

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ABSTRACT

Recently, forest education, which the Forest and Forestry Basic Act describes "promoting the use of forests for education", has been attracting attention. For its part, the Forestry Agency started to promote "Forest Environmental Education" and "Education for Wood Products Use". There are a wide variety of activities, but the actual types of activities in forests have not been understood. So sites in forests for forest education have not yet been considered. In order to gain a comprehensive understanding of the forests for forest education, outdoor and nature activities in forests were examined as actual activities of forest education. In this study, we analyzed the content of activities in forests and the places for activities through a questionnaire survey on outdoor nature activities in forests in Hachioji, Tokyo, Japan, and analyzed the relationship between the content of forest activities and places for activities. Due to the diversity of forest type and land use in this city, there should be many different type of forest activities. We sent various groups a questionnaire which were considered to be involved with forests activities, and then analyzed the contents of activities in forests, forest types and places for the forest activities through cross-tabulation. The survey started by asking whether any activities had been implemented, and if so, asking the details of the three main activities. We sent the questionnaire to 467 groups, of which 215 (46.0% of the total) responded in 2006. A total of 129 groups listed activities in forests (90.0% of the respondents). And 221 actual activities were recorded. We analyzed 209 activities implemented in Hachioji by 103 groups, without incomplete example data. The results of our investigation on the actual conditions revealed a wide variety of 13 kinds of forest activities. Every activity was carried out in all forests types, but "zokushoyashi" was used most frequently. Regarding site type, public places such as parks were used most frequently. To consider the relationship between contents of activities and forests, forest activities were characterized mainly by the use of forest sites, based on the ownership and the need to obtain permission for use. Forest activities tended to use forest sites related forest use form. Use-type (a) with no change to the forest such as walking/hiking was implemented mainly in "open areas" that allowed public access. Use-type (b) with a direct impact on forests was implemented mainly in "closed areas" with restricted use. Use-type (c) was mainly implemented in specially designated facilities. Another activity was held in various places with little impact on forests. Use-type (a) was most common. In conclusion, we considered that the content of forest activities is closely related to the use of the forest; especially the impact on forests from forest activities is a major factor. If forestry works were more widespread, it would be necessary to keep forest places where direct impacts on forests in open areas were allowed. Furthermore, it should be necessary to analyze the impact of each kind of activity on forests.

Keywords: forest education, outdoor experiences, nature experiences in forests, contents of activities, forest types

INTRODUCTION

Forest education has recently started attracting attention (INOUE, 2005). The Forest and Forestry Basic Act refers to "promoting the use of forests for education" (FORESTRY AGENCY, 2001), and the Forestry Agency has already started promoting
such campaigns as "Forest Environmental Education" and "Education for Wood Products Use" (FORESTRY AGENCY, 2006). Outdoor nature activities in a forest setting are diverse and have long been implemented for recreational and educational purposes. Foresters, forestry technicians, primary school teachers, social education officers, and forest instructors are among the many people who promote forest activities. The National Forest in Japan provides a natural setting for school field trips under the program "Fun Forest for Field Games and Environmental Education" (FORESTRY AGENCY, 2006).

However, according to previous studies, full consideration has never been given to places for forest education activities in Japan. Studies have been conducted on forest education, such as by SEKIOKA (1993, 1994) and KAMIZAKA (1998), and the history and present status of forest and forestry education have been reported by ENDO (1995), SEKIOKA (1999), and HAYASHI and HAYASHI (2006). Several new environmental education programs on forests have been reported (HIROSHIMA et al., 2006; INOUE and OISHI, 2008) and the contents of forest education have been classified into four elements (INOUE and OISHI, 2010). Public participation in forest management and sites for forest education were investigated by YAMAMOTO (1998) and activities at experimental forests for schools were reported by TAKEMOTO et al. (2001). However, there is little information to provide a comprehensive understanding of the places for forest education activities. Consequently, forest sites used for educational purposes have not been considered as an object of forest management. In order to advance forest education, it is essential that forest management including conservation recognize the use of forest education. To develop appropriate forest management plans for forest education, it is necessary to investigate the actual status of outdoor and nature activities in forests to fully understand forests for forest education. A wide range of outdoor nature activities were examined as actual activities of forest education.

In this study, we selected Hachioji, Tokyo, Japan as the site for our case study on various outdoor and nature activities in forests. Due to the diversity of forest type and land use in this city, there should be many different types of forest activities. We analyzed the relationship between the content of forest activities and places for activities through a questionnaire survey. This study is the first step towards establishing a system for utilizing forests for educational purposes.

**METHODS**

We analyzed the present status of outdoor nature activities in forests in terms of the content of forest activities and the places for activities through a questionnaire survey conducted in Hachioji, in order to gain a comprehensive understanding of the forests for forest education.

The study site was located in the city of Hachioji in Tokyo Metropolitan Prefecture, which varies in land use and forest type. Hachioji has a population of about 540,000 and an area of 186.31 km². It is about 40 km west of the center of Tokyo, and is one of the many commuter towns in the region. Heights above sea level ranges from 63 to 862 m. Forests in Hachioji occupy 42% of the total land area. Hilly land, forestry areas, and municipal parks rich in greenery and green tracts of land occupy 61% in total (Fig. 1). Data is from HACHIOJI CITY, 2010. The famous Mt. Takao is easily accessible by public railway from the center of Tokyo, and the surrounding low mountains are very popular hiking destinations that are also easily accessible. In this area, various green tracts of land are close to residential areas, so outdoor nature activities can be held in one day. The forests covering the mountains are classified into evergreen broadleaf including *Castaanopis sieboldii* and *Quercus glauca*, coniferous plantation including *Crypomeria japonica* and *Chamaecyparis obtusa*, and deciduous broadleaf including *Quercus acutissima* and *Q. serrata*.

The targets of the questionnaire survey were organizations and individuals considered to be involved in forest activities in Hachioji, according to a preliminary survey on sectors implementing outdoor nature activities (OISHI, 1998). Questionnaires were sent to 467 groups including various administrative offices (totaling 58 including environment, forestry, parks, education and sightseeing), schools (totaling 185 including 33 kindergartens, 69 elementary schools, 44 junior high schools, 20 high schools, 15 universities and 4 weekly children's schools), social education for children (totaling 147 including 83 nursery schools, and 64 children's centers), corporations including Boy and Girl Scouts (total 21), private corporations including woodworking plants (total 18), and citizens' groups (total 38). The questionnaire survey started by asking whether or not any activities had been implemented, and if so, the details of the three main activities, i.e., title and content, geographical place, forest type and ownership. Title and place of activity
were asked for as descriptive answers. Note that the answers to the questionnaire survey depended on the subjectivity of the respondents. The content of activities was selected from among 13 different choices (multiple-answer format) (ISHII et al., 2010): (1) Contact with nature, (2) Recreational use of forest area, (3) Ecology conservation, (4) Nature observation, (5) Collection of natural products for observation and learning, (6) Collection of natural products for utilization, (7) Natural environmental maintenance, (8) Provision of facilities in forests, (9) Forestry work, (10) Handicrafts, (11) Outdoor life, (12) Creative activity, (13) Outdoor sports.

Forest type was selected from among three choices (multiple-answer format): (1) Artificial forest (plantation), (2) Zouki-bayashi (coppices recognized as satoyama), and (3) Natural forest. Here, zouki-bayashi is not a technical term for the forest type, but is a type of secondary forest formerly managed for firewood and charcoal production, and is familiar to local residents. This forest type is found in hilly areas predominantly composed of deciduous broadleaf trees (Fig. 1). Therefore, we set zouki-bayashi as one of the choices.

Ownership was selected from three choices (multiple-answer format): (1) Public place (e.g., park), (2) Own property, and (3) Other ownership. The answers regarding forest type and land ownership were dependent on the subjectivity of the respondents, so we checked geographical places by the descriptive answers.

This survey was implemented in November 2006. We sent the questionnaire to the 467 groups, and received 215 (46%) of the total responses. We analyzed the content of forest activities in Hachioji, forest types and places for forest activities through cross-tabulation. We analyzed the relationship between the content of forest activities and the places for activities, and then considered the status of forests for educational activities.

RESULTS

The results of the questionnaire survey on forest activities revealed that a total of 129 groups including individuals were involved in forest activities (60.0% of the respondents). The number of actual activities was 224 in total. We were removed unsuitable activities due to implementation outside Hachioji, incomplete sample data, duplicate data, or unsuitable forest activities, i.e., agricultural work and river monitoring. Then, we analyzed 209 activities that were implemented in Hachioji by 103 groups. Junior high schools implemented forest activities, but all activities were held outside Hachioji or the response data was incomplete.

Classification of the 103 groups conducted the 209 activities was as follows: various administrative offices (totaling 32 activities including environment, forestry, parks, education and sightseeing), schools (totaling 61 activities including 19 by kindergartens, 23 by elementary schools, 7 by high schools and 12 by universities), social education for children (totaling 45 activities including 22 by nursery schools and 23 by children's centers), corporations including Boy and Girl Scouts (total 12 activities), private corporations including woodworking plants (total 19 activities), and citizens'groups (total 40 activities).

Various groups implemented forest activities. And since the forest areas are within the city, all activities could be held in one day, except for those designed for an extended stay as in the case of camps. Places for forest activities included not only forestry areas but also municipal parks and, grounds rich in greenery and hilly land near residential areas.

Contents of Forest Activities

Table 2 shows the keywords for the contents of forest activities classified into the 13 different kinds, and others. The contents of forest activities in actual practice revealed a wide variety of activities. Examples of the main keywords for forest activities appearing several times are as follows: mountain climbing and hiking, camping, games for get close to nature, many kinds of nature observation, and timber-felling and other types of forestry work. Also there were included school trips, walking and daily strolls, which were not usually recognized as forest activities. Since these activities were implemented in rich green areas, we considered them as types of outdoor experiences and forest activities. Distinguishing activities were those related to learning about forests and forestry, environmental leadership training and about experiences as a trainee monk since Mt. Takao is a holy mountain with a Buddhist temple situated at the top.

Figure 2 shows the amount of each of the 13 kinds of forest activities and other activities obtained from the multiple-answer questionnaire. Each of “Contact with nature” and “Nature observation” accounted for more than half of all activities.

Forest Type for Forest Activities

We examined the forest types used for forest activities. Figure 3 shows the forest type of the places where forest activities were carried out (multiple-answer). Zouki-bayashi was used most frequently in comparison to natural and artificial forests. Compared with the actual distribution of forest types in Hachioji (Fig. 1), zouki-bayashi was used frequently, 57% of the total forest activities, even though secondary forests such as zouki-bayashi occupy only 32% of the total actual vegetation in Hachioji. Zouki-bayashi is distributed in parks, and is mainly covered by Quercus serrata. Artificial forests and coniferous

Table 1 Keywords for outdoor nature experiences in forests

<table>
<thead>
<tr>
<th>Contents</th>
<th>Keywords for actual activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Contact with nature</td>
<td>games for get close to nature, stroll, school trip, play, forest therapy, tree climbing, adventure and exploration</td>
</tr>
<tr>
<td>(2) Recreational use of forest area</td>
<td>excursions to view the autumn leaves, recreational working</td>
</tr>
<tr>
<td>(3) Ecology conservation</td>
<td>Investigation for wildlife, vegetation survey or environmental survey for conservation, preservation activities include mowing</td>
</tr>
<tr>
<td>(4) Nature observation</td>
<td>tree gazing, bird watching, observation of insects, observation tour</td>
</tr>
<tr>
<td>(5) Collection of natural product for observation and learning</td>
<td>collection of acorns, fallen leaves, or insects for learning</td>
</tr>
<tr>
<td>(6) Collection of natural products for utilization</td>
<td>collection of firewood, nuts or berries for utilization, mushroom picking, gathering foods</td>
</tr>
<tr>
<td>(7) Natural environmental Maintenance</td>
<td>sweeping fallen litter, cleaning, conservation of coppice forests</td>
</tr>
<tr>
<td>(8) Provision of facilities in forests</td>
<td>building a tree house, constructing a walkway</td>
</tr>
<tr>
<td>(9) Forestry work</td>
<td>tree planting, brushing, pruning, thinning, cleaning, cutting, mushroom cultivation</td>
</tr>
<tr>
<td>(10) Handicraft</td>
<td>vegetable dyeing, woodwork, bamboo work</td>
</tr>
<tr>
<td>(11) Outdoor life</td>
<td>camping, outdoor cooking, cooking and eating natural foods</td>
</tr>
<tr>
<td>(12) Creative activity</td>
<td>outdoor artistic activity</td>
</tr>
<tr>
<td>(13) Outdoor sports</td>
<td>mountain climbing, hiking, picnics, mountain bike</td>
</tr>
<tr>
<td>(14) Others</td>
<td>experience of a trainee monk, promotion about forests and forestry, training environmental leaders</td>
</tr>
</tbody>
</table>

Fig. 2 Amount of each forest activity (multiple-response)
Fig. 3 Frequency of each forest type used for forest activities (multiple-response)

Fig. 4 Ratio of used forest types for each forest activity (multiple-response)

Fig. 5 Amount of forest activities classified by ownership of the forest places

forests range widely and are covered by Cryptomeria japonica (Tokyo Metropolitan Government, 2009), were not used in proportion to the ground cover. Natural forests were used frequently instead of small area.

Figure 4 shows the ratio of forest types for each of the forest activities (multiple-answer). All types of forest activities were implemented in all forest types; for example, forestry work and provision of facilities in forests were practiced mainly in artificial forests and Zouki-bayashi. All types of forests were recognized as places for forest activities, although the forest types in the answers were not exactly correlated to each other due to the subjectivity of the respondents.

Forest Site for Forest Activities

Ownership of the forest sites was examined. Figure 5 shows the number of forest used for forest activities classified by ownership (multiple-answer). Public places such as parks were used most frequently. According to the data on green tracts of land in Hachioji, municipal parks occupy 4.4% (283 ha) in total (HACHIOJI CITY, 2010), and there are four prefectural natural parks occupy more than 4,400 ha (Tokyo Metropolitan Government, 2009).

To obtain further details about the forest places for forest activities, they were classified based on the description of the geographical place for forest activities, consider to the owner-
ship and the need to obtain permission for use. There were listed 68 place names where the 209 forest activities were held. There were six categories of site format for forest activities as follows:

Natural parks: Public places with free access and hiking trails. Mt. Takao and three other places were included in this category, and they all occupy a large area.

Municipal parks: Public places with free access and green zones. This category included eleven city parks and five metropolitan parks. All parks include groves or coppices, three parks have a visitor center, three parks have a conservation area or coppice management area, and five parks have parking lots (TOKYO METROPOLITAN PARK ASSOCIATION, 2010). Large parks are mainly covered with zouki-bayashi; the largest park is 46 ha in area.

Campsites and facilities: Public or private places for special use. Here, users are required to make reservations and/or pay a fee. There were three campsites and one botanical garden on hilly land. This category included campsites with accommodations allowing overnight stay.

Experimental forests for schools and on-site facilities: Public or private ownership. In this category, 20 places were mentioned. In this place, use of forests is usually restricted to the members.

Preserved green areas and background forests: This category included preserved green areas, and forests for which the location was clear but ownership was not. In this category, 18 places were mentioned including five preserved green areas. This type of place usually requires permission for use.

Others: This included places for which the location and ownership were unclear but they are situated in Hachioji; for example, mountainous areas in Hachioji used for climbing/hiking or hilly land used for daily walks. In this category, there were 6 places.

Figure 5 shows the frequency of forest activities according to ownership and classified by these six kinds of forest site formats. Public place (park) included “National parks”, “Municipal parks” and “Campsites and facilities”. Own property was predominantly “Experimental forests for schools or on-site facilities”. Other ownership was predominantly “Preserved green areas and background forests”.

Relationship between Contents of Forest Activities and Places for Activities

We analyzed the relationship between the content of activities in forests and the forest site format mentioned above. Figure 6 shows the ratio of forest places by site format for each forest activity. Almost all activities were held in each site format, except “Ecology conservation”, “Creative activity” and “Provision of facilities in forests”.

The trend in type of forest site used for each activity could be characterized. Forest activities are arranged by the total ratio of “Natural parks”, “Municipal parks” and “Campsites and facilities” in Fig. 6. The majority of activities located in the upper part of Fig. 6, which were held in “Natural parks”, “Municipal parks” or “Campsites and facilities”, were “Outdoor sports”, “Contact with nature”, “Recreational use”, “Na-

![Fig.6 Ratio of types of site format classified by forest activities](image-url)
nature observation", "Ecology conservation", and "Outdoor life". "Outdoor sports" was mainly held in "Natural parks". "Outdoor life" was mainly held in "Campsites and facilities". "Ecology conservation" tended to be held in "Municipal parks". These activities were held mainly in public areas for public use.

On the contrary, the majority of activities located in the lower part of Fig. 6, which were held mainly in "Experimental forests for schools or on-site of facilities" and "Preserved green areas and background forests", were "Provision of facilities in the forest", "Forestry work", "Collection of natural products for observation and learning" and "Creative activity". "Provision of facilities in the forest" and "Forestry work" were mainly held in "Preserved green areas and background forests". "Creative activity" was mainly held in "Experimental forests for schools or on-site of facilities". These activities were held mainly in restricted or permission required areas.

In addition, "Handicrafts", "Natural environmental maintenance", and "Collection of natural products for utilization" were held in all kinds of site formats. Thus, forest activities were characterized mainly by the use of forest sites. Activities were divided by whether they were mainly held in public places with free access, or mainly held in restricted places, or held in various places. In other words, forest activities were divided by whether they were mainly held in public places or not.

To consider the relationship between forest activities and forests, this result was compared with previous results for forest activities. Osii and Inoue (2006) divided forest activities into four types of forest use form including six kinds according to contact with the forest. The six kinds of forest use form were as follows:

Direct use form: Activities held in a forest include contact with the forest. This activity was necessary to be held in forests. This use included two kinds divided by the degree of impact on forests.

Direct use form 1 with no impact on forests: Activities in a forest, with little impact on the forest such as observation, walking and forest recreation.

Direct use form 2 with strong impact on forests: Activities in a forest accompanied by a strong impact on the forest, such as cutting trees, collecting forest products, building facilities and installing a birdhouse.

Environmental use form: Activities held near forests using forests as natural scenery or activity area. These activities could be held outside forests, but forest areas were often used. This use included two kinds divided by degree of environmental modification.

Environmental use form 1 with no change to forests: Activities near in a forest, with little change to the environment such as hiking and cross-country skiing.

Environmental use form 2 in facilities: Activities held in facilities such as a camping site, a ski slope and an adventure playground.

Indirect use form: Activities using forest resources such as woodwork and eating bamboo shoots. This use need not be held in forests, so it could be held inside or outside forests. Theme use form: Creative activities with themes related with forests, for example, based on art or music about forests. This use could be held inside or outside forests.

The 13 kinds of forest activities in this study were applicable to the following forest use forms:

Direct use form 1: "Contact with nature", "Recreational use" and "Nature observation". Some activities included in "Ecology conservation" and "Natural environmental maintenance" were applicable to this form, such as investigations of wildlife.

Direct use form 2: "Provision of facilities in the forest", "Forestry work", "Collection of natural products for observation and learning", and "Collection of natural products for utilization". Some activities included in "Ecology conservation" and "Natural environmental maintenance" were applicable to this type, such as mowing and timber-felling for nature conservation.

Environmental use form 1: "Outdoor sports".

Environmental use form 2: "Outdoor life" mainly held in camping sites.

Indirect use form: "Handicrafts" Theme use form: "Creative activity".

The indirect use form and the Theme use form were held in a forest or green spaces in this study because forest activities in this study excluded those activities operated outside forests and green areas.

Comparing our results for forest site use in forest activities and these six kinds of forest use form by Osii and Inoue (2006), there are similar classifications. These can be divided into three types and others; applicable to forest use form, forest activities, and mainly forest site use were as follows:

(a) Environmental use form 1 and Direct use form 1, including "Outdoor sports", "Contact with nature", "Recreational use", and "Nature observation", were located in the upper part of Fig. 6. These types of activities were held mainly in "Natural parks" or "Municipal parks". This use type was not accompanied by a strong impact on forests.

(b) Direct use form 2, including "Provision of facilities in the forest", "Forestry work", and "Collection of natural products for observation and learning", were located in the lower part of Fig. 6. These types of activities were held mainly in "Experimental forests for schools or on-site of facilities" and "Preserved green areas and background forests". This use type was accompanied by a strong impact on forests.

(c) Environmental use form 2, including "Outdoor life", was held mainly in "Campsites and facilities".

Other activities, which included the Indirect use form, Theme use form, and both the Direct use type 1 and Direct use type 2, were located in the center of Fig. 6. These activities were held in various sites, and there effects on forests were considered to be not strong. The Indirect use form and

Theme use form, including “Handicrafts” and “Creative activity”, could both be held outside forests and were held in easily accessible areas in these results. “Ecology conservation” and “Natural environmental maintenance” including both the Direct use type 1 and Direct use type 2, could be held in conservation areas in parks. “Collection of natural products for utilization” fitted the Direct use type 1, including gathering nuts, acorns and pinecones for handicrafts by children, and it was considered not to have strong effects on forests in these results.

We considered the relationship between forest sites and contact with forests by each use-type activity. Use-type (a) was held without changes to the forest such as walking/hiking, and so its area of operation could be allowed in public places with free access. The Main area of operation of use-type (a) was considered to be “open areas”. Use-type (a) was most common. Use-type (c) was mainly implemented in specially designated facilities, and could be allowed for everyone provided reservations were made. On the contrary, use-type (b) was held with a direct impact on forests, and the area of operation could be restricted or could require permission for use. The Main area of operation of use-type (b) was considered to be “closed areas”. Another activity was held with little impact on forests, so it could be allowed in various places.

Thus, forest activities trended to use forest sites related to contact with forests. In other words, forest activities were characterized as to whether they could be allowed in “open areas” or not.

CONCLUSIONS

This research focused on the relationship between the content of forest activities and forest sites. To accomplish our objective we examined the present status of outdoor nature activities in forests through a questionnaire survey in Hachioji, Tokyo, Japan to gain a comprehensive understanding of the educational use of forests.

The first stage of our investigation, forest activities in actual practice in Hachioji, comprised a wide variety including walking and daily strolls in rich green spaces. All kinds of forest types were recognized as places for forest activities, but zurikbyashi was used most frequently. This agrees with the result that zurikbyashi is used most frequently at experimental forests for schools (TAKEMOTO et al., 2001). Regarding site type, public places such as parks were used most frequently.

In the second stage, we analyzed the relationship between forest activities and forest sites. Forest activities tended to use forest sites related to forest use form. Use-type (a) with no change to the forest such as walking/hiking was implemented mainly in “open areas” that allowed public access. Use-type (b) with a direct impact on forests was implemented mainly in “closed areas” with restricted use. Use-type (c) was mainly implemented in specially designated facilities. Another activity was held in various places with little impact on forests. Use-type (a) was most common.

To consider the status of forests for educational activities, forest activities of use-type (a), (c) and another activity were available for public use in “open areas”, but activities of use-type (b) were limited for use in “closed areas”. If use-type (b) activities are to be operated in schools without school forests, it is indispensable to find forests that can be used. Therefore, if use-type (b) activities such as forestry work become more widespread, it is necessary to keep forest places where direct impacts on forests are allowed in open areas. However, it is necessary to consider the impact of each forest activity on forests. Furthermore, forest activities require not only forest use but also guides or leaders for the activities as well as maintenance and management of the forests. It is necessary to inspect the actual relationship between forest activities and forest places through case studies.

In conclusion, our investigation on the status of forest educational activities revealed that all forest types are recognized as places for a wide variety of activities. We consider that the content of forest activities is closely related to the use of the forest; in particular, the allowable impact on the forest by forest activities is a major factor in closed forest areas. Therefore, it is necessary to keep forest places that can be used for various forest activities, if forest activities are needed to be more common. However, the trends in the content of forest activities and forest type were inferred from the multiple-answer questionnaire and depended on each respondent’s viewpoint. Therefore, further analysis of forest activities by investigating case studies should be carried out in the future. This study is the first step towards establishing a system for the utilization of forest sites for educational purposes. Research on the impact of each type of forest activity is important for determining the type of forest management needed for forest education sites.

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